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Trephining for Abscess of the Brain.

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HANKS to clinical study and physiological research, the time-honored aphorism, *ubi pus ubi incisio*, has found its worthiest application in cerebral lesions. For purulent foci in other parts there is always some avenue of evacuation possible. For an abscess of the brain, within an intact cranium, there is none. Therefore, unless routed by surgical interference, death is inevitable. It may be a question of weeks, or of months, even of years—the end is death. Happily, abscesses other than metastatic, are, as a rule, single, and whether secondary to a trauma, or the result of middle-ear disease, are, generally, not far removed from the primary lesion. Furthermore, the principles of cerebral localization are such valuable guides in determining the site of intra-cranial disease, that, in the light of the multiplication of relevant experience, the finding of an abscess is the usual, the failure to find the rare, outcome of the operative search for pus within the brain. It is on account of the negative results of the operation, as much as for other interesting features, that I beg to report the following case:

On the 21st of July a well-dressed man was brought to the Cincinnati Hospital by the police. He was found in a dazed condition, but gave his name—John H., and age 52—to the clerk of the institution. It was



found that he was a theatrical agent, and had recently come from a neighboring city. He was placed under the care of Dr. Querner, with whom I subsequently saw him. Physically, the man looked reduced in flesh and somewhat sallow. The pulse varied between 60 and 80. Respiration was normal. The temperature ranged during the first week of his stay between $97\frac{1}{2}^{\circ}$ and $100\frac{1}{2}^{\circ}$. Its course was irregular. The patient frequently gave mimic evidence of headache, and often during the day and night moaned violently from frontal headache. Over and parallel to the *left* eye brow was a recent scar, two and one-half inches long and non-adherent. It had evidently been made by some blunt instrument, and if suppuration was present at all it was slight. The wound had healed entirely before patient was admitted to the hospital. Pressure over the scar was not painful. Nor did percussion over the head elicit any point of special tenderness. In a comparatively lucid moment, the statement was obtained from the patient, that he had been wounded with a coupling pin, in Detroit, eight or nine weeks before admission to the hospital. This statement was subsequently verified by a letter, and the appearance of the cicatrix bore out the assertion. During the first week of his stay in the hospital there was no impairment of motion or sensation. The pupils, though equal, were sluggish. There was no disturbance of vision. Impairment of mentality was marked. Evidently of proper personal habits when in health, the patient had become indifferent in the extreme. When the nurse was not at hand he would use a bowl or the floor of his own or adjoining rooms in answering the calls of nature. For hours at a time he would lie upon his bed half clad, in a somnolent condition. At rare intervals his mind cleared up and he conversed intelligently, but always in a whisper or low tone of voice. He remembered having been injured in Detroit, but how or when he

could not state. When his mental condition was at its best he would appreciate the point of a question slowly, but clearly, and with his answers a quotation or witticism would at times be intermingled. With the slight evening exacerbations of temperature and of headache, the intellect became clouded, and a rational response could no longer be obtained.

At the end of a week it seemed certain that the case was one of cerebral abscess, probably secondary to an infected wound of the scalp. The variation in the symptoms, the violence of the headache, the slight elevation of temperature, and the reduced psychic activity, together with the rapid development of the symptoms, made it certain that an abscess had developed in a "latent" zone of the frontal lobe, probably of the left side, since this was the side of the primary wound. If surgical interference was delayed, it was because of the inability to determine the side of the cerebral lesion. If the abscess, situated in the left frontal lobe, were large enough to so thoroughly make itself manifest by the usual evidences of suppuration, and of increased intracranial pressure, one should expect that backward and upward pressure must involve the speech or motor centers of the tongue and face, and reveal itself by impaired or spasmodic movements of the corresponding muscles.

On the morning of the ninth day a slight drooping of the left angle of the mouth was discernible. On the following day the paresis was more marked and involved the entire lower half of the left side of the face. The general and intellectual conditions were unchanged. Speech was not impaired. On the eleventh day the paresis had affected the left arm and forearm, and on the evening of that day the paralysis was complete in face and arm. The leg was not involved. Sensation did not seem materially impaired. During the night the temperature rose to

102 $\frac{2}{5}$ °, the pulse to 96. Delirium had supervened. The discharges from rectum and bladder were involuntary.

The moment the facial paresis had supervened it was decided that the abscess was situated in the right frontal lobe. An operation would have been resorted to at once, but considerable time was lost in telegraphing to relatives for a consent to the operation. Without obtaining it, the operation was made on the afternoon of the twelfth day, Drs. Querner and Carson being present.

OPERATION.—After outlining the central fissure after the manner of John Chiene, the cranium was exposed by semi-circular incisions of three inches in diameter, base downwards. From over its central portion a button of bone an inch in diameter was removed. The dura projected into the wound, appeared tenser than usual, and did not pulsate. Color normal. With rongeur forceps the external aperture was enlarged until it measured one and one-half inches in diameter. The dura was next opened by crucial incision. The pia seemed more congested than normal. Fluctuation was even now not discernible. With a grooved director exploratory punctures were made in eight different directions to a depth of three inches. The grooved director when brought to the surface contained some blood and brain detritus, but pus was not obtained. The trepanning had failed of results. Hemorrhage from two points of the pia was quite free and necessitated ligation. The wound in the dura was not closed. A strand of fine silk was placed underneath for drainage, and the external wound closed.

The patient's condition did not seem in any way influenced by the operation. The temperature for twenty-four hours after it remained about 102°. The pulse became more frequent and the delirium continued. Forty-eight hours later stertorous breathing

and profound coma supervened. Death resulted on the third day after the operation, and the fifteenth of his stay in the hospital.

AUTOPSY BY DR. FREEMAN.—Margins of external wound agglutinated throughout. Underneath the dura, in the central portion of the wound, a mass of brain detritus and blood, large as a finger nail, projected slightly above the level of the cortex. It occupied an area joining the middle and lower thirds of the central sulcus. The pia beyond this area was not more congested than in other parts of the convexity. On the orbital surface of the frontal lobe the pia was very much thickened and cloudy, brain substance underneath very much softened and of reddish color. Dissection of the brain from above displayed numerous sections in the medullary tissue of the tracks made by the grooved director. They appeared as colored spots, large as a pin's head. The ventricles contained a small quantity of clear fluid. On making transverse sections through the lower half of the brain an abscess was discovered in the frontal lobe, involving the anterior extremity of the corpus striatum. Covered by the orbital convolutions underneath the abscess extended through the medullary substance of the lobe and into the corpus striatum, stopping short of its ventricular surface. The abscess cavity, about as large as a walnut, was oblong in shape, its long diameter from before backwards. It contained a little less than an ounce of a thin yellowish-green flaky pus, devoid of odor. A well-defined sac wall was not found. For a sixth of an inch about the abscess proper the brain substance was softer than normal and red in color. At one point the track made by the grooved director was less than a fourth of an inch from the outer wall of the abscess. Careful examination of the skull failed to reveal a fracture.

Abscesses of the brain, other than from direct or indirect infection, can no longer be conceived.

Excluding cases of cerebral metastasis, as but a feature of a general condition, and the still rarer softening of tubercular growths, abscesses of the brain depend either on an infected trauma of its soft or bony coverings, or on non-traumatic disease of the middle ear. It is only of the abscess of traumatic origin that the case presented warrants consideration to-night. Viewed from an etiological, anatomopathological and clinical standpoint, traumatic abscesses of the brain may be divided into two great classes; those which develop early after the infliction of the trauma, and are generally true cortical abscesses, and those which develop late and are deep-seated or at least sub-cortical. Fortunately, it is to the first category that most cases of cerebral abscesses belong. Literature is replete with cases in which the mere incision of the dura was followed by an outflow of pus. Such abscesses are never far removed from the site of the trauma. They develop in contused parts of the brain, and contusions, rarely extend far into the medulla. Clinically, they may manifest themselves with the foudroyance of an acute lepto-meningitis, often within a week, rarely later than one or two months after the trauma was inflicted. The cortical abscess is but the purulent infection continued from without into an area of blood-infiltrated brain tissue.

The course of infection in the deep-seated abscesses is far more difficult to demonstrate. Whether it proceed along the lymph channels, or the smaller veins, the infection rarely crosses the mid-line of the body, and is ordinarily not far removed from the part first injured. The same rule obtains in abscesses following middle-ear disease. Of seventy-six cases collected by Barr (*Brit. Med. Journal*, 1887, I, p. 723), fifty-five were found in the temporal lobe. In every instance the abscess developed on the side of the primary disease. In the case presented no plausible explanation can be given of the circuitous course pursued by the

infection process from a wound of the soft parts of the left side of the forehead to the frontal lobe of the right. From rather comprehensive study of the relevant literature, I am inclined to believe that in this regard the case reported is unique.

While it is deplorable that a surgical triumph failed of achievement, the fatal termination, better than a recovery could have done, adds another to the many facts bearing witness to the importance of cerebral localization. Except in their posterior portions, the frontal lobes still belong to the latent zones of the brain. It is quite certain that extensive lesions on either side will impair mental activity, but save through some incidental external clue, as a wound or choked disc, which in abscesses is far less common than in tumors, there is no method of determining with certainty the side of the disease. Until the facial paresis had supervened on the ninth day, there was no thought of an abscess on the right side. Had the symptoms of general pressure demanded speedy interference, the operation would certainly have been performed on the left side, in the vicinity of the cicatrix. The appearance of the facial paresis was a positive index to the site of the lesion, and when the operation was performed it was with the hope of finding a sub-cortical abscess beneath the central convolutions. It was believed that the abscess would be found of considerable size and without well-defined sac wall, from the large number of cortical fibers deprived of their functions, as indicated by the extent of the paresis, and from the rapid evolution of the localizing phenomena.

The lesions, as revealed by the autopsy, fully explain the symptoms *intra-vitam*. While the abscess was small, and involved but the anterior portion of the corpus striatum, the motor projection fibers of the internal capsule were not involved. It required but little additional growth to make sufficient backward

pressure on the capsule behind the knee to impair in quick succession the fibers for the face and upper extremity. As in the classical apoplexy, it requires but a small clot, relatively speaking, to produce a hemiplegia; so in the case presented, a small abscess, by slight growth, impaired the projection fibres of the greater part of the pyramidal tract.

In the event of success from the operation, *per se*, the result would have doubtless been the same. The meningitis, developed from the basal side of the abscess, doubtless was the immediate cause of the rapid rise of temperature, delirium and coma which preceded death. Unfortunately, after a cerebral abscess is drained, death too often claims the patient. The late Dr. Agnew collected 18 cases operated on in Philadelphia; in two cases no abscess was found, in one it was discovered at the autopsy. In 16 cases the diagnosis was correct, and the abscess in each instance evacuated. Yet all of these patients died, life in no case being prolonged beyond fourteen days.

Regarding the technique of the operation, I would observe that I am not enamored of the grooved director in searching for deep-seated abscess of the brain. Although recommended by Keen, it does not appear to me certain to permit pus of thick consistence to come to the surface. That there is some danger of wounding delicate vessels with the sharp point of an aspirating needle, there can be no doubt. In the future I shall use a hollow needle, with small blunt end, for the detection of pus. When, full of some aseptic fluid, it is introduced through the brain mass, there is no danger of clogging, and that of wounding a vessel made practically impossible.

